

ABSTRACTS

Sensitometric Control in the Development of Sound Films—II. ALFRED KÜSTER AND RICHARD SCHMIDT. *Kinotechnik*, 13, April 5, 1931, pp. 123-6. Sensitometric control in the development of variable density sound films is maintained by means of an exposing box and an Agfa gammameter. A strip of film is exposed on the box which has a sensitometric scale of five different densities in steps of 0.25. This strip is developed with the sound film and then placed on the gammameter to determine the gamma. This instrument has 12 rows of 5 densities each, corresponding to 12 different gammas, placed over an opal glass illuminated from below. When the film is placed on the gammameter with the densest step on the film over the series of light steps of the gammameter, it is found that the five steps of the film strip assume a uniform density when they cover the five steps of one of the rows of the instrument. The gamma corresponding to this row is then read directly and is the same as the gamma of the strip.

It has been found that with constant development, the gamma of a sound film, as determined by its effect on a photoelectric cell, differs from that of a sensitometric strip measured in contact with an opal glass on account of two effects which act in opposite directions. The first is the Callier effect, as a result of which the sound record has a gamma 1.2 times that of the sensitometric strip. The second is the Schwarzschild effect, resulting from the difference in exposure time and intensity of the sensitometric strip and sound record. This causes the sound film to have a gamma $\frac{1}{1.7}$ as high as that of the sensitometric strip. This factor was found to hold for Agfa 12 developer for a number of varieties of sound film and different development times but is different for different developers. The product of the factors, $\frac{1}{1.4}$, is the factor by which the gamma of the sensitometric strip must be multiplied to find the gamma of the sound record with the same development. This factor is valid for Agfa 12 developer only. M. W. S.

The Problem of Sound Motion Pictures by Radio. FRITZ WINCKEL. *Kinotechnik*, 13, Feb. 20, 1931, pp. 64-5. A German television receiver serves for the reproduction of standard sound films, since it operates with 1,200 picture elements and 25 pictures per second. The transmitter consists of a sound film projector in connection with a Nipkow scanning disk. The film moves continuously in the projector. It is claimed that the picture quality appears better as a result of the accompanying sound reproduction. Another receiver employs 12.5 pictures per second to conform with the standards of the German Postal Service. The sound accompaniment is said to have a favorable effect upon the picture quality in this apparatus also, although the picture quality is not as good as in the former apparatus. The 12.5 pictures per second are transmitted by the aid of an optical device with mirrors and lenses which combines two succeeding pictures, the combined picture being scanned. The broadcasting of sound films is being considered in Germany. It is hoped that a 42-hole scanning disk instead of

the present 30-hole disk will be employed, and that 25 pictures per second will be sent. Short-wave transmission will be necessary. It is also hoped that the sound film standard will be changed to 25 pictures per second. M. W. S.

A Consideration of Screen Brightness Measurements in Motion Picture Theaters. H. SCHERING. *Kinotechnik*, 13, Feb. 20, 1931, pp. 59-63. Measurements were made of the intensity of illumination and visual brightness of the screens of eight Berlin theaters and two Dresden theaters. It is concluded that in the projection of black-and-white films on solid screens, great economy of current could be achieved in the smaller theaters by the use of automatic feeding devices for the carbon arcs; that in the larger theaters with screens over 6 meters in width, the projection apparatus installed is hardly adequate; and that in almost all cases the screen is in such poor condition that the minimum screen brightness required is not attained.

Data were obtained for three theaters having porous screens for sound film projection. In all cases, the visual brightness of the screen was far below the required value on account of the poor reflecting power of the screen. The brightness calculated on the basis of a more efficient sound film screen of 65 per cent reflecting power is still too low. In the two larger theaters, it was found that the projection apparatus was inadequate even with efficient adjustment.

On the assumption that color films require twice the illumination required for black-and-white films, it is concluded that the projection apparatus in the theaters having screens 4 meters in width would still suffice for sound films in color, provided that automatic feeding of the carbons were employed. The theaters having screens over 6 meters in width would require a thorough change in the illuminating system in order to effect a material increase in the illumination. This cannot be effected by increasing the current or the aperture of the mirror, and must be done by increasing the intrinsic brightness of the crater. The author concludes that the arcs with high intensity (cored) carbons must be adopted in Germany for the projection of color films. Illustrations are given of American and German high intensity arc lamps for projectors. M. W. S.

A Recent Demonstration of Television and Telecinema. A. LOVICH. *Technique Cinemat.*, 2, Mar.-April, 1931, p. 17. A demonstration of the Barthélemy system of television is described. The transmitter employs a Weiller scanning disk, a horizontal wheel carrying on its periphery thirty mirrors inclined at varying angles to the axis. The scanning beam is reflected from these mirrors to the subject and then to the photoelectric cells. There is a brief lapse between the end of one scanning line and the beginning of the next, and these lapses add a 480-cycle frequency to the image modulation. This frequency, filtered by an ingenious amplifying circuit, is used to operate a synchronous motor which drives the receiving scanning disk. The reproducing circuit is not described, but it is claimed that a 3-watt neon lamp is used for a picture area of 600 square centimeters as opposed to a 250-watt lamp for a picture area of 6 square centimeters in the American system. H. P.

Temperature Control during Film Development. T. THORNE-BAKER. *Kinemat. Weekly (Supp.)* 172, June 18, 1931, pp. 41, 43. The importance of accurate control of the temperature during film development is stressed. Equal results may be obtained within the temperature range of 58°F. to 75°F. if the time of development is correspondingly altered in accordance with the temperature co-

efficient of the particular developing agent used. The temperature coefficient is a measure of the relative increase of the velocity of development produced by a rise of temperature of 10 degrees Centigrade (18°F.) and may be obtained from the following relation:

$$\frac{\log t_1 - \log t_2 \times 10}{T_2 - T_1} = \log c,$$

where t_1 and t_2 are the times of first appearance at the Centigrade temperatures T_1 and T_2 , respectively, and c is the temperature coefficient. (The terms in the published formula are confused and the substitution given in the example is incorrect, although the correct answer is shown.)

The use of a Dewar flask or thermos bottle is mentioned for the constant temperature development of test strips of film. Electrical heating of the processing solutions may be controlled conveniently by the use of thermostats of the usual mercury contact type or with a Lowry type of tube, which contains in the expansion bulb a liquid of low specific heat and high coefficient of expansion, such as toluene or aniline. With electrical thermostats two stages of relays are necessary, one for the weak thermostat current and a second more robust instrument for the heater current. Heaters of 300 watts capacity per 2 gallon quantity of solution are suggested. The temperature of the solutions may also be controlled by the room temperature, and a brief description is given of methods used by English firms. The necessity for refrigeration during certain seasons is indicated, but no description of equipment is given.

L. E. M.

The Trans-Lux System of Operation. GEORGE SCHUTZ AND F. H. RICHARDSON. *Mot. Pict. Herald*, 103, Sect. 2, May 9, 1931, pp. 12-3. A description of the first of a chain of small theaters seating 150 to 200 patrons. This theater is 45 feet long by 30 feet wide by 14 feet high, and seats 158 persons. Rear projection is used, the projectors being located about 10 feet behind the screen. (The Trans-Lux lens system requires that there be an inch of projection distance allowed for each square foot of projected image.) Horns are located at the sides of the screen. The film is reversed (left to right) before placing in the projector, and the entire sound head is located on the right side of the projector pointing backward.

G. E. M.

Recording Processes for Sound Films. *Technique Cinemat.*, 2, Mar.-April, 1931, pp. 22-39. Descriptions of the following processes are given: Tobis, Gaumont-Peterson-Poulsen, Western Electric, and Stille. Diagrams and illustrations are included.

G. E. M.

Natural and Unnatural Synchronism. R. THUN. *Kinotechnik*, 13, March 1, 1931, pp. 93-5. In natural synchronism, the pictorial representation of the process producing the sound and the reproduction of the sound by the loud speaker have a time relation corresponding to reality; while, in unnatural synchronism, the process apparently producing the sound coincides exactly with the reproduction of the sound by the loud speaker. Some of the principles of synchronizing with a picture speech in a foreign language are described to illustrate the complexity of the time relation between sound and picture that is denoted by the word "synchronism." For a proper artistic effect, natural synchronism is required, and not the unnatural synchronism demanded by hypercritical observers. M. W. S.

The New Sound Film Apparatus of Tobis-Klangfilm for News Recording.

J. KIRSTAEDTER. *Kinotechnik*, 13, March 1, 1931, pp. 91-3. The motion picture camera and sound recording apparatus are fitted into a large limousine. Pictures may be taken from the moving car, or the camera may be set on a tripod on the ground or on top of the car. Current is supplied by storage batteries. Plate, grid, and Kerr cell potentials are supplied by dry batteries. M. W. S.

The Debris Sound Film Camera. L. KUTZLEB. *Kinotechnik*, 13, March 1, 1931, pp. 88-91. The Debris "Parvo T" camera differs from the previous model "L" principally in having larger film magazines which hold 300 meters of film to meet the requirements of sound films with 24 pictures per second and longer scenes. Upon throwing the switch the motor does not immediately attain its full speed, but reaches full speed very quickly. This is done to avoid straining the mechanism. In the event that the motor should be started when the camera is not ready to operate, or that an accident should occur during operation, a wooden coupling breaks in the driving mechanism between the motor and the camera. Another device stops the motor by electromagnetic means if the film is not fed properly through the gate. Registration marks for synchronizing may be applied at the edge of the film by a lamp or in the picture area immediately below the aperture by means of a punch. In order to reduce noise, the camera housing is lined with rubber, and the gears are constructed of such materials that steel does not work upon steel. A second sound absorbing case covers the entire camera, provision being made for making adjustments on the camera with the case closed. The camera and case are balanced in trunnions on the tripod. A long handle, instead of cranks, serves for panoraming and tilting. The usual form of tripod, with metal braces, is used out of doors, but a heavy column type of stand is used in the studio. One form of studio stand is operated entirely by electric motors.

M. W. S.

The Selenophon Recording and Reproducing Apparatus. G. E. ROTH. *Kinotechnik*, 13, March 1, 1931, pp. 84-8. The Selenophon sound recording apparatus employs a wire under tension between the poles of an electromagnet. When at rest, the wire covers half the light image of a slit. When current from a microphone flows through the wire causing it to vibrate, it uncovers more or less of the slit image. The device may be used for either the variable width or variable density method of sound recording. In the variable width method, the wire is placed at a slight angle to the slit, so that the length of the slit image changes. In the variable density method, the wire is placed parallel to the slit so that the width changes. In practice, the Selenophon Company uses the variable width method. Eight sound records are made in the width of a 35 mm. film.

The reproducing apparatus employs a selenium cell of the condenser type. In this cell a condenser is cut perpendicularly to the plates so that the edges of the interlocking plates are exposed. A thin layer of selenium forms a conducting medium between the edges of the plates. This device is built into apparatus that can be attached to a standard motion picture projector.

The Selenophon Company also makes three models of apparatus for reproducing sound without pictures for home use.

M. W. S.

Notes on Loud Speaker Response Measurements and Some Typical Response Curves. BENJAMIN OLNEY. *Proc. I. R. E.*, 19, No. 7, July, 1931, p. 1113. The difficulties encountered in the measurements of loud speaker output are de-

scribed. A typical set-up for taking curves indoors is explained. Greater accuracy of measurement, especially in the low-frequency range, is obtained by making measurements out of doors. An out-door set-up for making loud speaker output measurements is explained and illustrated. The effects of various corrugations in loud speaker cones, and the effects of different types of baffles are illustrated by numerous curves. The interpretation of loud speaker response curves is shown to be a comparative interpretation rather than a direct reading of what one may expect to hear.

A. H. H.

High Audio Power from Relatively Small Tubes. L. E. BARTON. *Proc. I. R. E.*, 19, No. 7, July, 1931, p. 1131. The reasons for the development of the present power output tubes are pointed out. Class "A" amplifiers are explained as well as the factors limiting the power output of such amplifiers. It is shown that the output load resistance for maximum undistorted power output is a function of the plate current and plate voltage, and is practically independent of the plate resistance and amplification constant, provided the grid swing is not limited. The principles of operation of class "B" audio amplifiers are thoroughly explained with the aid of numerous diagrams. The power output of a class "B" amplifier is limited only by emission or plate dissipation on peak signals. For class "B" amplifiers the bias supply must be well regulated or batteries must be used.

A. H. H.

The Prevention of Interfering Noises. P. T. SHERIDAN. *Motion Picture Herald*, Section 2, July 4, 1931, p. 31. This article, the first of three on this subject, although non-technical, is of interest to the engineer. It covers those noises which are transmitted through the air to the theater audiences. Several sources of noises and possible corrective measures are given. Projectionists' conversations, loud operation of the monitor speaker, handling of film, poor reels, and noises from the projection machine itself are mentioned as possible sources of this type of noise.

A. H. H.

The Measurement of Reverberation Time and Its Application to Acoustic Problems in Sound Pictures. F. L. HOPPER. *J. Acoustical Soc.*, II, No. 4, April, 1931, pp. 499-505. A reverberation time meter is briefly described. The results of typical measurements are shown, including the reverberation time *vs.* frequency curves of two sound stages, a theater before and after acoustical treatment, and the absorption-frequency characteristics of acoustic building board and rockwood.

W. A. M.

A Direct Reading Audio-Frequency Phase Meter. W. R. MACLEAN AND L. J. SIVIAN. *J. Acoustical Soc.*, II, No. 4, April, 1931, pp. 419-33. A direct reading audio-frequency phase meter, which includes a cathode ray oscillograph and special vacuum tube circuit, is described. As an illustration of the type of work to which this phase meter is well suited, an acoustical experiment is described in which the response *vs.* frequency and phase angle *vs.* frequency of each of two microphones, hung indoors, are measured in detail between 1,500 and 1,505 cycles per second. Their combined outputs are also studied and show, in this particular case, a variation of almost 30 db. in response and a variation of over 100 degrees in phase angle within this frequency band only five cycles wide.

W. A. M.

A New High Efficiency Theater Loud Speaker of the Directional Baffle Type. HARRY F. OLSON. *J. Acoustical Soc.*, II, No. 4, April, 1931. A description

of a new directional baffle speaker together with a theoretical discussion of design. Curves showing the efficiency *vs.* frequency, response *vs.* frequency, and directional properties of the speaker are included. . . . W. A. M.

Sound Pictures: Fundamental Principles and Some Factors Which Affect Their Quality. F. L. HUNT. *J. Acoustical Soc.*, II, No. 4, April, 1931, pp. 476-84. This paper reviews the fundamental principles of sound picture recording and reproduction on disk and film, showing that sound pictures in the modern sense were dependent on the development of the vacuum tube amplifier which made available adequate energy for recording and reproduction, and also on the use of electrical methods of synchronization and speed control. The present status of the art relative to frequency and volume ranges and the effect of limitations in these factors on quality is then discussed. The effect of reflected sound reverberation on the fidelity of recording in the studio and on reproduction in the theater is also considered. The best articulation is obtained when reflected sound is not present, but some reflection is usually necessary to maintain the illusion that the sound was produced under the conditions depicted in the scene. The high per cent of articulation obtained by experiment with standard reproducing equipment indicates that little difficulty should be experienced in understanding as far as equipment is concerned. This shows the importance of good auditorium acoustics. W. A. M.

Acoustics of Music Rooms. VERN O. KNUDSEN. *J. Acoustical Soc.*, II, No. 4, April, 1931, pp. 434-67. This paper "represents an attempt to consider the problem of music room acoustics in the light of recent developments in acoustics and the tested results of experience; and to call attention to certain problems which require further investigation." The ideal conditions for the artistic production of music and the conditions for listening to music are listed and discussed. These include freedom from noise; the proper arrangement of spaces for orchestra, soloist, chorus, organ, and audience; proper loudness; proper reverberation characteristics; resonance; echoes, interfering reflections and sound foci; and variation of the acoustical properties of a room with the size of the audience.

A section is devoted to data recently collected by the author regarding the acoustics of thirteen European music rooms. The many factors affecting the acoustics of these, of which the reverberation time of each is only one factor, are weighed and discussed. The apparent need for resonant panels of wood or plaster, or both, as a part of the ideal music room, is emphasized. The data also indicate that the reverberation times of those music rooms which enjoy the best reputations are shorter than have generally been accepted as optimal in the past. An example of the general point of view of the author is illustrated as follows: "Here, as in the Musikvereinsaal, good acoustical properties are identified with rather short reverberation times (1.35 and 1.5 seconds at 512 d.v., and about double these values at 128 d.v.), with shapes that are free from pronounced concave surfaces, and with rooms that are bounded, in large part, with resonant materials. It should be mentioned also that both halls are remarkably free from outside noises."

A very practical conclusion to the paper is given in four illustrations giving plans of four music rooms, varying in size from a small music studio to an opera house, such that they embody the desirable features of design advocated in the text. W. A. M.

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